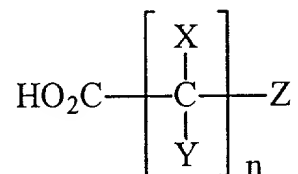


What is claimed is:

1. A composition comprising:
(A) an effective amount of at least one compound of formula I



Formula I

wherein each X is independently H, halogen, OH, SH, oxo, (C₁-C₈)alkyl group;

each Y is independently H, (C₁-C₈)alkyl group,

Z is H, OH, SH, COOH, or (C₁-C₈)alkyl group;

n is an integer between 1 and 10, inclusive;

and salts thereof; and

an effective amount of at least one compound from group II wherein group II compounds include a ketone having 3-10 carbon atoms, carbon dioxide, (C₂-C₁₀)alkene, (C₁-C₁₀)aldehyde, an alcohol having 1-8 carbon atoms, a halogenated compound containing 1-8 carbon atoms, a nitrile containing 2-4 carbon atoms, an ether containing 3-10 carbon atoms, (C₆-C₁₀)aryl group, a sulfide containing 1-8 carbon atoms and (C₃-C₁₀)heterocyclic group;

wherein any one or more of the (C₆-C₁₀)aryl group or (C₃-C₁₀)heterocyclic group may be substituted at any one or more positions with a substituent selected from the group consisting of H, oxo, halogen, OH, SH, COOH, COO(C₁-C₈)alkyl group, (C₁-C₈)alkyl group, (C₁-C₈)alkyl sulfide and (C₁-C₈)alkyl group;

and salts thereof; wherein the composition is effective to attract arthropods; or

(B) a composition comprising an effective amount of tartaric acid or an acceptable salt thereof;

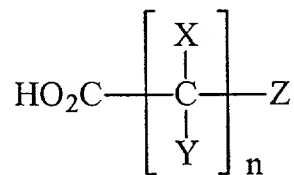
and an effective amount of at least one compound from group II wherein group II compounds include a ketone having 3-10 carbon atoms, (C₂-C₁₀)alkene, (C₁-C₁₀)aldehyde, an alcohol having 1-8 carbon atoms, a halogenated compound containing 1-8 carbon atoms, a nitrile containing 2-4 carbon atoms, an ether containing 3-10 carbon atoms, carbon dioxide, (C₆-C₁₀)aryl group, a sulfide containing 1-8 carbon atoms and (C₃-C₁₀)heterocyclic group;

wherein any one or more of the (C₆-C₁₀)aryl or (C₃-C₁₀)heterocyclic may be substituted at any one or more positions with a substituent selected from the group consisting of H, oxo, halogen, OH, SH, COOH, COO(C₁-C₈)alkyl group, (C₁-C₈)alkyl group, (C₁-C₈)alkyl sulfide and (C₁-C₈)alkyl substituted with at least one substituent selected from the group consisting of H, OH, SH and halogen;

and salts thereof;

wherein the composition is effective to attract arthropods; or

(C) a composition comprising an effective amount of at least one



Formula I

compound of formula I

wherein each X is independently H, halogen, OH, SH, oxo, (C₁-C₈)alkyl, or (C₁-C₈)alkyl substituted with at least one substituent selected from the group consisting of H, OH, SH and halogen;

each Y is independently H, (C₁-C₈)alkyl, or (C₁-C₈)alkyl substituted with at least one substituent selected from the group consisting of H, OH, SH and halogen, or Y is absent when X is oxo;

Z is H, OH, SH, COOH, (C₁-C₈)alkyl, or (C₁-C₈)alkyl substituted with at least one substituent selected from the group consisting of H, OH, SH and halogen;

n is an integer between 1 and 10, inclusive;

and acceptable salts thereof;

and an effective amount of at least one compound from group II wherein group II compounds include a ketone having 3-10 carbon atoms, (C₂-C₁₀)alkene, (C₁-C₁₀)aldehyde, an alcohol having 1-8 carbon atoms, a halogenated compound containing 1-8 carbon atoms, a nitrile containing 2-4 carbon atoms, an ether containing 3-10 carbon atoms, carbon dioxide, (C₆-C₁₀)aryl group, a sulfide containing 1-8 carbon atoms and (C₃-C₁₀)heterocyclic group;

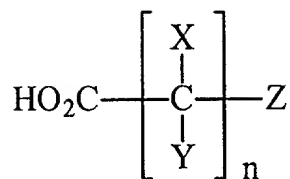
and salts thereof;

with the proviso that the compound of formula I does not consist solely of glycolic acid, oxalic acid, acetic acid, hydraacrylic acid, pyruvic acid, glyceric acid, 3-hydroxypyruvic acid, malonic acid, 3-hydroxybutyric acid, 2-methylactic acid, 2-hydroxybutyric acid, 2-oxobutyric acid, isobutyric acid, butyric acid, malic acid, 2-oxovaleric acid, 2-hydroxyvaleric acid, 2-hydroxyvaleric acid, valeric acid, isovaleric acid, 2-methylvaleric acid, hexanoic acid, mercaptoacetic acid, thiolactic acid, 3-mercaptopropionic acid, thiopropionic acid, 3-mercaptopropionic acid, 2-bromopropionic acid, 2-bromobutyric acid, 2-chloropropionic acid, 3-chloropropionic acid, lactic acid or formic acid;

and salts thereof;

wherein the composition is effective to attract arthropods.

2. A composition comprising an effective amount of at least one compound of formula I



Formula I

wherein each X is independently H, halogen, OH, SH, oxo, (C₁-C₈)alkyl group;

each Y is independently H, (C₁-C₈)alkyl group,

Z is H, OH, SH, COOH, or (C₁-C₈)alkyl group;

n is an integer between 1 and 10, inclusive;

and salts thereof; and

an effective amount of at least one compound from group II wherein group II compounds include a ketone having 3-10 carbon atoms, (C₂-C₁₀)alkene, (C₁-C₁₀)aldehyde, an alcohol having 1-8 carbon atoms, a halogenated compound containing 1-8 carbon atoms, a nitrile containing 2-4 carbon atoms, an ether containing 3-10 carbon atoms, (C₆-C₁₀)aryl group, carbon dioxide, a sulfide containing 1-8 carbon atoms and (C₃-C₁₀)heterocyclic group;

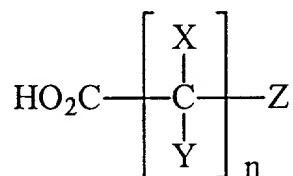
wherein any one or more of the (C₆-C₁₀)aryl group or (C₃-C₁₀)heterocyclic group may be substituted at any one or more positions with a substituent selected from the group consisting of H, oxo, halogen, OH, SH, COOH, COO(C₁-C₈)alkyl group, (C₁-C₈)alkyl group, (C₁-C₈)alkyl sulfide, (C₁-C₈)alkyl group, and NR₁R₂ wherein R₁ and R₂ are independently selected from the group consisting of (C₁-C₈)alkyl and H;

and salts thereof; wherein the composition is effective to attract arthropods.

3. The composition of claim 1 wherein the arthropod is a mosquito belonging to the genera Culex, Aedes, Mansonia, Wyeomyia, Psorophora, Coquillettia or Anopheles.
4. The composition of claim 1 wherein X is H, OH or CH₃.
5. The composition of claim 1 wherein Y is H.
6. The composition of claim 1 wherein n is 1 or 2.
7. The composition of claim 1 wherein the compound of formula I is lactic acid, glycolic acid, thiolactic acid, tartaric acid or an acceptable salt thereof.
8. The composition of claim 1 wherein the compound of formula I is lactic acid or an acceptable salt thereof.
9. The composition of claim 1 wherein the ketone is acetone, 2-butanone, 2-pentanone, 2-hexanone, 2-heptanone, 3-pentanone, 3-hexanone, 3-heptanone, 4-heptanone, 5-nonanone, 3-methyl-2-butanone, 4-methyl-2-pentanone, 3-penten-2-one, 3-buten-2-one, 3-hydroxy-2-butanone, 2,3-butanedione or 2,4-pentanedione.
10. The composition of claim 1 wherein the alcohol is methanol, ethanol, 1-octen-3-ol or 1-hepten-3-ol.
11. The composition of claim 1 wherein the halogenated compound is methylene chloride, chloroform, carbon tetrachloride or bromoform.
12. The composition of claim 1 wherein the nitrile is acetonitrile, benzonitrile or phenylacetonitrile.

13. The composition of claim 1 wherein the ether is diethyl ether.
14. The composition of claim 1 wherein (C₆-C₁₀)aryl is p-cresol, benzonitrile, phenol or toluene.
15. The composition of claim 1 wherein the sulfide is carbon disulfide, dimethyl sulfide, diethyl sulfide, dimethyl disulfide, diethyl disulfide, methyl propyl disulfide, ethyl vinyl sulfide, dimethyl sulfoxide or dimethyl trisulfide.
16. The composition of claim 1 wherein (C₃-C₁₀)heterocyclic is 2-methylfuran.
17. The composition of claim 1 wherein (C₂-C₁₀)alkene is isoprene, 1-heptene, 1-octene or 1-nonene.
18. The composition of claim 1 wherein the aldehyde is formaldehyde, acetaldehyde, butyraldehyde, isobutyraldehyde, nonanal or benzaldehyde.
19. The composition of claim 1 wherein formula I compounds comprise lactic acid and group II compounds comprise acetone and dimethyl disulfide.
20. The composition of claim 1 wherein formula I compounds comprise lactic acid and group II compounds comprise acetone, dimethyl sulfide and carbon dioxide.
21. The composition of claim 1 further comprising an effective amount of at least one volatile component of skin extract or hair extract.

22. A method of attracting arthropods comprising the step of exposing the environment with a composition comprising an effective amount of at least one compound of formula I



Formula I

wherein each X is independently H, halogen, OH, SH, oxo, (C₁-C₈)alkyl group;

each Y is independently H, (C₁-C₈)alkyl group,

Z is H, OH, SH, COOH, or (C₁-C₈)alkyl group;

n is an integer between 1 and 10, inclusive;

and salts thereof; and

an effective amount of at least one compound from group II wherein group II compounds include a ketone having 3-10 carbon atoms, carbon dioxide, (C₂-C₁₀)alkene, (C₁-C₁₀)aldehyde, an alcohol having 1-8 carbon atoms, a halogenated compound containing 1-8 carbon atoms, a nitrile containing 2-4 carbon atoms, an ether containing 3-10 carbon atoms, (C₆-C₁₀)aryl group, a sulfide containing 1-8 carbon atoms and (C₃-C₁₀)heterocyclic group;

wherein any one or more of the (C₆-C₁₀)aryl group or (C₃-C₁₀)heterocyclic group may be substituted at any one or more positions with a substituent selected from the group consisting of H, oxo, halogen, OH, SH, COOH, COO(C₁-C₈)alkyl group, (C₁-C₈)alkyl group, (C₁-C₈)alkyl sulfide and (C₁-C₈)alkyl group;

and salts thereof;

wherein the composition is effective to attract arthropods; or

(B) a composition comprising an effective amount of tartaric acid or an acceptable salt thereof;

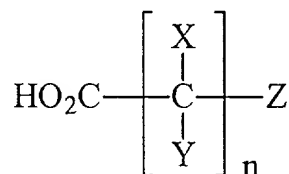
and an effective amount of at least one compound from group II wherein group II compounds include a ketone having 3-10 carbon atoms, (C₂-C₁₀)alkene, (C₁-C₁₀)aldehyde, an alcohol having 1-8 carbon atoms, a halogenated compound containing 1-8 carbon atoms, a nitrile containing 2-4 carbon atoms, an ether containing 3-10 carbon atoms, carbon dioxide, (C₆-C₁₀)aryl group, a sulfide containing 1-8 carbon atoms and (C₃-C₁₀)heterocyclic group;

wherein any one or more of the (C₆-C₁₀)aryl or (C₃-C₁₀)heterocyclic may be substituted at any one or more positions with a substituent selected from the group consisting of H, oxo, halogen, OH, SH, COOH, COO(C₁-C₈)alkyl group, (C₁-C₈)alkyl group, (C₁-C₈)alkyl sulfide and (C₁-C₈)alkyl substituted with at least one substituent selected from the group consisting of H, OH, SH and halogen;

and salts thereof;

wherein the composition is effective to attract arthropods; or

(C) a composition comprising an effective amount of at least one



Formula I

compound of formula I

wherein each X is independently H, halogen, OH, SH, oxo, (C₁-C₈)alkyl, or (C₁-C₈)alkyl substituted with at least one substituent selected from the group consisting of H, OH, SH and halogen;

each Y is independently H, (C₁-C₈)alkyl, or (C₁-C₈)alkyl substituted with at least one substituent selected from the group consisting of H, OH, SH and halogen, or Y is absent when X is oxo;

Z is H, OH, SH, COOH, (C₁-C₈)alkyl, or (C₁-C₈)alkyl substituted with at least one substituent selected from the group consisting of H, OH, SH and halogen;

n is an integer between 1 and 10, inclusive;

and acceptable salts thereof;

and an effective amount of at least one compound from group II

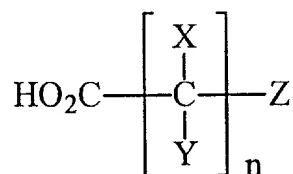
wherein group II compounds include a ketone having 3-10 carbon atoms, (C₂-C₁₀)alkene, (C₁-C₁₀)aldehyde, an alcohol having 1-8 carbon atoms, a halogenated compound containing 1-8 carbon atoms, a nitrile containing 2-4 carbon atoms, an ether containing 3-10 carbon atoms, carbon dioxide, (C₆-C₁₀)aryl group, a sulfide containing 1-8 carbon atoms and (C₃-C₁₀)heterocyclic group;

and salts thereof;

with the proviso that the compound of formula I does not consist solely of glycolic acid, oxalic acid, acetic acid, hydraacrylic acid, pyruvic acid, glyceric acid, 3-hydroxypyruvic acid, malonic acid, 3-hydroxybutyric acid, 2-methylactic acid, 2-hydroxybutyric acid, 2-oxobutyric acid, isobutyric acid, butyric acid, malic acid, 2-oxovaleric acid, 2-hydroxyvaleric acid, 2-hydroxyvaleric acid, valeric acid, isovaleric acid, 2-methylvaleric acid, hexanoic acid, mercaptoacetic acid, thiolactic acid, 3-mercaptopropionic acid, thiopropionic acid, 3-mercaptopropionic acid, 2-bromopropionic acid, 2-bromobutyric acid, 2-chloropropionic acid, 3-chloropropionic acid, lactic acid or formic acid;

and salts thereof.

23. A method of attracting arthropods comprising the step of exposing the environment with a composition comprising an effective amount of at least one compound of formula I



Formula I

wherein each X is independently H, halogen, OH, SH, oxo, (C₁-C₈)alkyl group;

each Y is independently H, (C₁-C₈)alkyl group,

Z is H, OH, SH, COOH, or (C₁-C₈)alkyl group;

n is an integer between 1 and 10, inclusive;

and salts thereof; and

an effective amount of at least one compound from group II wherein group II compounds include a ketone having 3-10 carbon atoms, carbon dioxide, (C₂-C₁₀)alkene, (C₁-C₁₀)aldehyde, an alcohol having 1-8 carbon atoms, a halogenated compound containing 1-8 carbon atoms, a nitrile containing 2-4 carbon atoms, an ether containing 3-10 carbon atoms, (C₆-C₁₀)aryl group, a sulfide containing 1-8 carbon atoms and (C₃-C₁₀)heterocyclic group;

wherein any one or more of the (C₆-C₁₀)aryl group or (C₃-C₁₀)heterocyclic group may be substituted at any one or more positions with a substituent selected from the group consisting of H, oxo, halogen, OH, SH, COOH, COO(C₁-C₈)alkyl group, (C₁-C₈)alkyl group, (C₁-C₈)alkyl sulfide, (C₁-C₈)alkyl group, and NR₁R₂ wherein R₁ and R₂ are independently selected from the group consisting of (C₁-C₈)alkyl and H;

and salts thereof.

24. The method of claim 22 wherein the arthropod is a mosquito belonging to the genera Culex, Aedes, Mansonia, Wyeomyia, Coquillettia, Psorophora or Anopheles.

25. The method of claim 22 wherein X is H, OH or CH₃.

26. The method of claim 22 wherein Y is H.

27. The method of claim 22 wherein n is 1 or 2.

28. The method of claim 22 wherein formula I compounds comprise lactic acid, glycolic acid, thiolactic acid, tartaric acid or an acceptable salt thereof.
29. The method of claim 22 wherein formula I compounds comprise lactic acid or an acceptable salt thereof.
30. The method of claim 22 wherein the ketone is acetone, 2-butanone, 2-pentanone, 2-hexanone, 2-heptanone, 3-pentanone, 3-hexanone, 3-heptanone, 4-heptanone, 5-nonanone, 3-methyl-2-butanone, 4-methyl-2-pentanone, 3-penten-2-one, 3-buten-2-one, 3-hydroxy-2-butanone, 2,3-butanedione or 2,4-pentanedione.
31. The method of claim 22 wherein the alcohol is methanol, ethanol, 1-octen-3-ol or 1-hepten-3-ol.
32. The method of claim 22 wherein the halogenated compound is methylene chloride, chloroform, carbon tetrachloride or bromoform.
33. The method of claim 22 wherein the nitrile is acetonitrile, benzonitrile or phenylacetonitrile.
34. The method of claim 22 wherein the ether is diethyl ether.
35. The method of claim 22 wherein (C₆-C₁₀)aryl is p-cresol, phenol or toluene.
36. The method of claim 22 wherein the sulfide is carbon disulfide, dimethyl sulfide, diethyl sulfide, dimethyl disulfide, diethyl disulfide, methyl propyl disulfide, ethyl vinyl sulfide, dimethyl sulfoxide or dimethyl trisulfide.

37. The method of claim 22 wherein (C₃-C₁₀)heterocyclic is 2-methylfuran.
38. The method of claim 22 wherein (C₂-C₁₀)alkene is isoprene, 1-heptene, 1-octene or 1-nonene.
39. The method of claim 22 wherein the (C₁-C₁₀)aldehyde is formaldehyde, acetaldehyde, butyraldehyde, isobutyraldehyde, nonanal or benzaldehyde.
40. The method of claim 22 wherein formula I compounds comprise lactic acid or an acceptable salt thereof and group II compounds comprise acetone and dimethyl disulfide.
41. The method of claim 22 further comprising an effective amount of at least one volatile component of skin extract or hair extract.
42. An attractant for mosquitoes comprising the composition of claim 1 added to a commercial or home-made trap.